NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WINDBREAK/SHELTERBELT ESTABLISHMENT

(Ft.)

CODE 380

DEFINITION

Windbreaks or shelterbelts are single or multiple rows of trees and/or shrubs in linear configurations.

PURPOSE

- Reduce soil erosion from wind
- Protect plants from wind related damage
- Alter the microenvironment for enhancing plant growth
- Manage snow deposition
- Provide shelter for structures, animals, recreation areas and people
- Enhance wildlife habitat
- Provide noise screens
- Provide visual screens
- Provide road safety
- Improve air quality by reducing and intercepting air borne particulate matter, chemicals and odors
- Delineate property and field boundaries
- Improve irrigation efficiency
- Increase carbon storage in biomass and soils

CONDITIONS WHERE PRACTICE APPLIES

Apply this practice on any areas where linear plantings of woody plants are desired and suited for controlling wind, noise and visual resources. Use other tree/shrub practices when wind, noise and visual problems are not a concern.

CRITERIA

General Criteria Applicable To All Purposes

The location, layout and density of the planting will accomplish the purpose and function intended within a 20-year period.

Refer to Tree/Shrub Site Preparation (490) for preparing site conditions for plant establishment.

The maximum design height (H) for the windbreak or shelterbelt shall be the expected height of the tallest row of trees or shrubs at age 20 for the given site.

Species must be adapted to the soils, climate and site conditions.

Spacing between individual plants shall be based on the needed growing space for plant type and species, the accommodation of maintenance equipment and the desired characteristics of the stem(s), branches and canopy as required for a specific purpose.

The windbreak will be oriented as close to perpendicular as possible to the troublesome wind.

The length of the windbreak will be sufficient to protect the site, including consideration for the “end effect” and changes in wind direction.

Avoid planting trees or shrubs where they will interfere with structures and above or below ground utilities.

Moisture conservation or supplemental watering shall be provided for plant establishment and growth where natural precipitation is too low for the selected species.

Refer to Tree/Shrub Establishment (612) for further guidance on planting trees and shrubs.

Additional Criteria to Reduce Wind Erosion and Protect Growing Plants

The interval between windbreaks shall be determined using current, approved wind erosion technology. Interval widths shall not exceed that permitted by the soil loss tolerance (T) or other planned soil loss objective. Calculations shall account for the effects of other practices in the conservation management system.

For wind erosion control, temporary measures will be installed to supplement the windbreak until it is fully functional.

Sites, fields and plants are protected within an area ten times the design height (H) on the leeward side and two times the design height (H) on the windward side of the windbreak.

Select species that are taller than the crops being protected.

Additional Criteria to Manage Snow Deposition

The windbreak will be oriented as close to perpendicular as possible to the snow-bearing wind.

For snow distribution across a field, the windbreak density (during expected snow-producing months) shall not be less than 25 percent or greater than 50 percent. The interval between barriers will not exceed 20H.

For snow accumulation, the minimum barrier density, during expected snow-producing months, will be 50 percent.

The length of the windbreak will extend beyond the area being protected to allow for end drifts.

Windbreaks will be located so that snow deposition will not pose a health or safety problem, management constraints or obstruct human, livestock or vehicular traffic. Snow trapping requires a minimum of 150 feet from windward tree/shrub rows to area to be protected.

To prevent shading and icing conditions, medium to tall trees (40-90 feet design height) planted to south or east of roadways shall be set back a minimum of 80 feet from the road's centerline. Shrubs and small to medium trees (10- 40 feet design height) planted to south or east of roadways shall be set back a minimum of 50 feet from the road's centerline.

Where water erosion and/or runoff from melting snow are a hazard, it shall be controlled by supporting practices.

Access roads through the windbreak should not be oriented parallel to the prevailing wind direction.

Additional Criteria to Provide Shelter for Structures, Livestock and Recreation Areas

The windbreak will be oriented as close to perpendicular as possible to the snow-bearing wind.

For wind protection, multiple rows (2-5) with minimum barrier density of 65 percent during the months of the most troublesome winds will be designed.

The area to be protected will fall within a leeward distance of 10H.

Farmstead and feedlot windbreaks should be located so the windward row is at least 100 feet from buildings, driveways and feed bunks in order to provide adequate room for leeward snow drifting and snow storage.

Drainage of snowmelt from the windbreak shall not flow across the livestock area.

Drainage of livestock waste and feed materials from the livestock area shall not flow into the windbreak.

Additional Criteria for Noise Screens

Noise screens shall be at least 65 percent dense during the time of the year when noise is a problem and as close to the noise source, as practicable.

The length of the noise screen shall be twice as long as the distance from the noise source to the receiver.

For high-speed traffic noise, the barrier shall not be less than 65 feet wide. For slower speed traffic noise, the barrier width shall not be less than 20 feet wide.

Species selected will be tolerant to noxious emissions, sand, gravel depositions or salt spray from traffic areas.

Species selection shall avoid food source species such as preferred browse and fruit bearing species that would attract wildlife.

Additional Criteria for Visual Screens

Visual screens shall be located as close to the observer as possible with a density, height and width to sufficiently block the view between the area of concern and the sensitive area.

Additional Criteria Improve air quality by reducing and intercepting air borne particulate matter, chemicals and odors.

The windbreak interval shall be less than or equal to 10H depending on site conditions and related supporting conservation practices.

Windbreak density on the windward side of the problem source (i.e., particulate, chemical or odor) shall be greater than 50 percent to reduce the airflow into the source area.

Windbreak density on the leeward side of the problem source, and windward of the area to be protected, shall be greater than 65 percent.

Select and maintain tree and shrub species with foliar and structural characteristics to optimize interception, adsorption and absorption of airborne chemicals or odors.

Additional Criteria for Increasing Carbon Storage in Biomass and Soils

Maximize width and length of the windbreak to fit the site.

For optimal carbon sequestration, select plants that have higher rates of sequestration in biomass and soils.

Plant and manage the appropriate plant spacing for the site that will maximize above and below ground biomass production

Minimize soil disturbance during establishment and maintenance of the windbreak/shelterbelt.

Additional Criteria for Enhancing Wildlife Habitat.

Plant species selection shall benefit targeted wildlife species.

Design dimensions of the planting shall be adequate for targeted wildlife species.

Additional Criteria for Improving Irrigation Efficiency

For sprinkler irrigation systems, the windbreak design height shall be taller than the spray height.

The windbreak shall not interfere with the operation of the irrigation system.

CONSIDERATIONS

Consider enhancing aesthetics by using evergreen species or species with features such as showy flowers, brilliant fall foliage or persistent colorful fruits.

When designing and locating a windbreak or shelterbelt, consider the impact upon the landowner's or public's view of the landscape.

Selection of plants for use in windbreaks should favor species or varieties tolerant to herbicides used in the area.

Plants that may be alternate hosts to undesirable pests should be avoided.

All plantings should complement natural features.

Tree or shrub rows should be oriented on or near the contour where water erosion is a concern. Where water erosion and/or runoff from melting snow is a hazard, it should be controlled by supporting practices.

Wildlife needs should be considered when selecting tree or shrub species. Species diversity should be considered.

Species diversity, including use of native species, should be considered to avoid loss of function due to species-specific pests.

Windbreaks for odor and chemical control increase in effectiveness as the amount of foliage available for intercept increases. Multiple row, wide plantings offer greater interception potential than do smaller plantings.

When using trees and shrubs for greenhouse gas reductions, prediction of carbon sequestration rates should be made using current, approved carbon sequestration modeling technology.

A shelterbelt can be used as a travel corridor to connect existing patches of wildlife habitat.

In cropping systems, select windbreak and shelterbelt species that minimize adverse affects to crop growth (e.g. shade, allelopathy, competing root systems or root sprouts).

PLANS AND SPECIFICATIONS

ID-CPA-027 Windbreak-Shelterbelt Planting Specification will be prepared for applying this practice for each site. Refer to Idaho Plant Materials Technical Note No. 43 Tree Planting, Care and Management for additional guidance.

This practice shall be recorded using approved narrative statements in the conservation plan or other acceptable documentation.

OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance).

Replacement of dead trees or shrubs will be continued until the windbreak/shelterbelt is functional.

Supplemental water will be provided as needed.

Thin or prune the windbreak/shelterbelt to maintain its function.

Inspect trees and shrubs periodically and protect from adverse impacts including insects, diseases or competing vegetation. The trees or shrubs will also be protected from fire and damage from livestock and wildlife.

Periodic applications of nutrients may be needed to maintain plant vigor.

REFERENCES

Idaho Field Office Technical Guide, Section II contains soils interpretations for windbreaks.

Idaho Field Office Technical Guide, Section VI contains Technical Notes under Forestry and Plant Materials that should be utilized as design and maintenance references.

The Idaho Tree Planting Handbook and North Dakota Tree Handbook located in Idaho Field Office Technical Guide Reference Library are additional references that will assist the planner.